HARGIS + ASSOCIATES, INC.

APPENDIX D

DATA VALIDATION SUMMARY REPORT (DVSR) NO. 19
FORMER MONTROSE CLOSED PONDS AREA INVESTIGATION

Data Validation Summary Report
Former Montrose Closed Ponds Area (CPA) Groundwater
Henderson, Nevada
July 2008

Prepared for

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LIST OF ACRONYMS AND ABBREVIATIONS

CCV	Continuing Calibration Verification
CPA	Closed Ponds Area
DQO	Data Quality Objectives
DVSR	Data Validation Summary Report
LCS/LCSD	Laboratory Control Sample / Laboratory Control Sample Duplicate
LDC	Laboratory Data Consultants, Inc.
MS/MSD	Matrix Spike / Matrix Spike Duplicate
PARCC	Precision, Accuracy, Representativeness, Comparability, Completeness
QA/QC	Quality Assurance / Quality Control
RPD	Relative Percent Difference
RRF	Relative Response Factor
SDG	Sample Delivery Group
SVOC	Semivolatile Organic Compound
TDS	Total Dissolved Solid
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
mg/L	Milligram per Liter
ug/L	Micrograms per Liter
%D	Percent Difference
%R	Percent Recovery
%RSD	Percent Relative Standard Deviation

1.0   INTRODUCTION

This data validation summary report (DVSR) has been prepared by Laboratory Data Consultants, Inc. (LDC) to assess the validity and usability of laboratory analytical data for the July 2008 groundwater sampling conducted at the Former Montrose Closed Ponds Area in Henderson, Nevada. The groundwater sampling was performed by GeoSyntec Consultants as part of the *Work Plan to Further Evaluate Lithologic and Hydrogeologic Conditions at the Closed Ponds Area (CPA)* (May 30, 2008) and included the collection and analyses of six environmental and quality control (QC) samples. The analyses were performed by the following methods:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) SW 846 Method 8260B
Semivolatile Organic Compounds (SVOCs) by EPA SW 846 Method 8270C
Chlorinated Pesticides by EPA SW 846 Method 8081A
Metals by EPA SW 846 Method 6020/7470A
Dissolved Metals by EPA SW 846 Method 6010B

Wet Chemistry:
Conductivity by EPA Method 120.1
Bromide, Chloride, Fluoride, Nitrate, Nitrite, Orthphosphate and Sulfate by EPA Method 300.0
Perchlorate by EPA Method 314.0
Ammonia as Ammonium by EPA Method 350.3
Alkalinity by Standard Method 2320B
Total Dissolved Solids (TDS) by Standard Method 2540C
Cation/Anion Balance by Calculation Method

Analytical services were provided by Test America, Inc. The samples were grouped into one sample delivery group (SDG). The environmental samples are associated with QA/QC samples designed to document the data quality of the entire SDG or a sub-group of samples within an SDG. Table I is a cross-reference table listing each sample, analysis, SDG, collection date, laboratory sample number, and matrix. All shaded samples in Table I were reviewed under EPA Level IV guidelines.

The laboratory analytical data were validated in accordance with procedures described in the Nevada Division of Environmental Protection (NDEP) *Data Verification and Validation Requirements* established for the BMI Plant Sites and Common Areas Projects, Henderson, Nevada, May 3, 2006. Approximately twenty percent of the analytical data were validated according to EPA Level IV data validation procedures and eighty percent of the analytical data were validated according to EPA Level III data validation procedures. The analytical data were evaluated for quality assurance and quality control (QA/QC) based on the following documents: *Quality Assurance Project Plan Site-wide Soil and Groundwater Investigations Former Montrose and Stauffer Sites, Henderson, Nevada (*QAPP), Revision 1.0, October 26, 2006, *Contract Laboratory Program National Functional Guidelines for Organic Data Review*, October 1999, *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, October 2004, and the *EPA SW 846 Third Edition, Test Methods for Evaluating Solid Waste,* update I, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996*;* update IV, February 2007.

This report summarizes the QA/QC evaluation of the data according to precision, accuracy, representativeness, completeness, and comparability (PARCC) relative to the project data quality objectives (DQOs). This report provides a quantitative and qualitative assessment of the data and identifies potential sources of error, uncertainty, and bias that may affect the overall usability.

The PARCC summary report evaluates and summarizes the results of QA/QC data validation for the entire sampling program. Each analytical fraction has a separate section for each of the PARCC criteria. These sections interpret specific QC deviations and their effects on both individual data points and the analyses as a whole. Section 8.0 presents a summary of the PARCC criteria by comparing quantitative parameters with acceptability criteria defined in the project DQO's. Qualitative PARCC criteria are also summarized in this section.

Precision and Accuracy of Environmental Data

Environmental data quality depends on sample collection procedures, analytical methods and instrumentation, documentation, and sample matrix properties. Both sampling procedures and laboratory analyses contain potential sources of uncertainty, error, and/or bias, which affect the overall quality of a measurement. Errors for sample data may result from incomplete equipment decontamination, inappropriate sampling techniques, sample heterogeneity, improper filtering, and improper preservation. The accuracy of analytical results is dependent on selecting appropriate analytical methods, maintaining equipment properly, and complying with QC requirements. The sample matrix also is an important factor in the ability to obtain precise and accurate results within a given media.

Environmental and laboratory QA/QC samples assess the effects of sampling procedures and evaluate laboratory contamination, laboratory performance, and matrix effects. QA/QC samples include: trip blanks, equipment blanks, field duplicates, method blanks, laboratory control samples and laboratory control sample duplicates (LCS/LCSDs), surrogate spikes, matrix spike/matrix spike duplicates (MS/MSDs), and laboratory duplicates.

Before conducting the PARCC evaluation, the analytical data were validated according to the Quality Assurance Project Plan (October 2006), the Functional Guidelines (USEPA 1999, 2004), and EPA SW 846 Third Edition, Test Methods for Evaluating Solid Waste. Samples not meeting the acceptance criteria were qualified with a flag, an abbreviation indicating a deficiency with the data. The following are flags used in data validation.

J-   Estimated The associated numerical value is an estimated quantity with a negative bias. The analyte was detected but the reported value may not be accurate or precise.

J+   Estimated The associated numerical value is an estimated quantity with a positive bias. The analyte was detected but the reported value may not be accurate or precise.

J   Estimated The associated numerical value is an estimated quantity. It is not possible to assess the direction of the potential bias. The analyte was detected but the reported value may not be accurate or precise. The "J" qualification indicates the data fell outside the QC limits, but the exceedance was not sufficient to cause rejection of the data.

R   Rejected The data is unusable (the compound or analyte may or may not be present). Use of the "R" qualifier indicates a significant variance from functional guideline acceptance criteria. Either resampling or reanalysis is necessary to determine the presence or absence of the rejected analyte.

U   Nondetected Analyses were performed for the compound or analyte, but it was not detected. The "U" designation is also applied to suspected blank contamination. The "U" flag is used to qualify any result detected in an environmental sample at a concentration less than 10 times the value of the concentration in any associated blank for common laboratory contaminants and less than 5 times the concentration in any associated blank for all other contaminants.

UJ   Estimated/Nondetected Analyses were performed for the compound or analyte, but it was not detected and the sample quantitation or detection limit is an estimated quantity due to poor accuracy or precision. This qualification is also used to flag possible false negative results in the case where low bias in the analytical system is indicated by low calibration response, surrogate, or other spike recovery.

A   Indicates the finding is based upon technical validation criteria.

P   Indicates the finding is related to a protocol/contractual deviation.

None   Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

The hierarchy of flags is listed below:

R > J   The R flag will always take precedence over the J qualifier.

J > J+ or J-   A non-biased (J) flag will always supersede biased (J+ or J-) flags since it is not possible to assess the direction of the potential bias.

J = J+ plus J-   Adding biased flags with opposite signs will result in a non-biased flag.

UJ = U (and modified concentration) plus J or J+ or J-   The UJ flag is used when a non-detected (U) flag is added to a biased or non-biased flag.

Table II lists the reason codes used. Reason codes explain why flags have been applied and identify possible limitations of data use. Reason codes are cumulative except when one of the flags is R then only the reason code associated to the R flag will be used.

Tables III present the overall qualified results after all the flags or validation qualifiers and associated reason codes have been applied.

Once the data are reviewed and qualified according to the QAPP and the functional guidelines, the data set is then evaluated using PARCC criteria. PARCC criteria provide an evaluation of overall data usability. The following is a discussion of PARCC criteria as related to the project DQOs.

Precision is a measure of the agreement or reproducibility of analytical results under a given set of conditions. It is a quantity that cannot be measured directly but is calculated from percent recovery data. Precision is expressed as the relative percent difference (RPD):

$$RPD = (D1-D2)/\{1/2(D1+D2)\} \text{ X } 100$$

where:
D1 = reported concentration for the sample
D2 = reported concentration for the duplicate

Precision is primarily assessed by calculating an RPD from the percent recoveries of the spiked compounds for each sample in the MS/MSD pair. In the absence of an MS/MSD pair, a laboratory duplicate or LCS/LCSD pair can be analyzed as an alternative means of assessing precision. An additional measure of sampling precision was obtained by collecting and analyzing field duplicate samples, which were compared using the RPD result as the evaluation criteria.

MS and MSD samples are field samples spiked by the laboratory with target analytes prior to preparation and analysis. These samples measure the overall efficiency of the analytical method in recovering target analytes from an environmental matrix. A LCS is similar to an MS/MSD sample in that the LCS is spiked with the same target analytes prior to preparation and analysis. However, the LCS is prepared using a controlled interference-free matrix instead of a field sample aliquot. Laboratory reagent water is used to prepare aqueous LCS. The LCS measures laboratory efficiency in recovering target analytes from either an aqueous matrix in the absence of matrix interferences.

For inorganics analysis, one primary sample is analyzed and accompanied by an unspiked laboratory duplicate. The data reviewer compares the reported results of the primary analysis and the laboratory duplicate, then calculates RPDs, which are used to assess laboratory precision.

Laboratory and field sampling precision are further evaluated by calculating RPDs for field sample duplicate pairs. The sampler collects two field samples at the same location and under identically controlled conditions. The laboratory then analyzes the samples under identical conditions.

An RPD outside the numerical QC limit in either MS/MSD samples or LCS/LCSD indicates imprecision. Imprecision is the variance in the consistency with which the laboratory arrives at a particular reported result. Thus, the actual analyte concentration may be higher or lower than the reported result.

Possible causes of poor precision include sample matrix interference, improper sample collection or handling, inconsistent sample preparation, and poor instrument stability. In some duplicate pairs, results maybe reported in either the primary or duplicate samples at levels below the reporting limit or non-detected. Since these values are considered to be estimates, RPD exceedances from these duplicate pairs do not suggest a significant impact on the data quality.

Accuracy is a measure of the agreement of an experimental determination and the true value of the parameter being measured. It is used to identify bias in a given measurement system. Recoveries outside acceptable QC limits may be caused by factors such as instrumentation, analyst error, or matrix interference. Accuracy is assessed through the analysis of MS, MSD, LCS, and samples containing surrogate spikes. In some cases, samples from multiple SDGs were within one QC batch and therefore are associated with the same laboratory QC samples. Surrogate spikes are either isotopically labeled compounds or compounds that are not typically detected in the samples. Surrogate spikes are added to every blank, environmental sample, LCS, MS/MSD, and standard, for the organic analyses. Accuracy of inorganic analyses is determined using the percent recoveries of MS and LCS analyses.

Percent recovery (%R) is calculated using the following equation:

$$\%R = (A-B)/C \times 100$$

where:
A = measured concentration in the spiked sample
B = measured concentration of the spike compound in the unspiked sample
C = concentration of the spike

The percent recovery of each analyte spiked in MS/MSD samples, LCS, and surrogate compounds added to environmental samples is evaluated with the acceptance criteria specified by the previously noted documents. Spike recoveries outside the acceptable QC accuracy limits provide an indication of bias, where the reported data may overestimate or underestimate the actual concentration of compounds detected or quantitation limits reported for environmental samples.

Representativeness is a qualitative parameter that expresses the degree to which the sample data are characteristic of a population and is evaluated by reviewing the QC results of blank samples and holding times. Positive detects of compounds in the blank samples identify compounds that may have been introduced into the samples during sample collection, transport, preparation, or analysis. The QA/QC blanks collected and analyzed are method blanks.

A method blank is a laboratory grade water or solid matrix that contains the method reagents and has undergone the same preparation and analysis as the environmental samples. The method blank provides a measure of the combined contamination derived from the laboratory source water, glassware, instruments, reagents, and sample preparation steps. Method blanks are prepared for each sample of a similar matrix extracted by the same method at a similar concentration level.

For inorganic analyses, initial and continuing calibration blanks consist of acidified laboratory grade water, which are injected at the beginning and at a regular frequency during each 12 - hour sample analysis run. These blanks estimate residual contaminants from the previous sample or standards analysis and measure baseline shifts that commonly occur in emission and absorption spectroscopy.

Equipment blanks consist of analyte-free water poured over or through the sample collection equipment. The water is collected in a sample container for laboratory analysis. These blanks are collected after the sampling equipment is decontaminated and measure efficiency of the decontamination procedure. Equipment blanks were collected and analyzed for all target analytes.

Field blanks consist of analyte-free source water stored at the sample collection site. The water is collected from each source water used during each sampling event. Field blanks were collected and analyzed for all target analytes.

Contaminants found in both the environmental sample and a blank sample are assumed to be laboratory artifacts if the concentration in the environmental sample is less than 10 times the blank value for common laboratory contaminants; methylene chloride, acetone, 2-butanone, and phthalate esters or 5 times the blank value for other laboratory contaminants.

Holding times are evaluated to assure that the sample integrity is intact for accurate sample preparation and analysis. Holding times will be specific for each method and matrix analyzed. Holding time exceedances can cause loss of sample constituents due to biodegradation, precipitation, volatization, and chemical degradation.

Comparability is a qualitative expression of the confidence with which one data set may be compared to another. It provides an assessment of the equivalence of the analytical results to data obtained from other analyses. It is important that data sets be comparable if they are used in conjunction with other data sets. The factors affecting comparability include the following: sample collection and handling techniques, matrix type, and analytical method. If these aspects of sampling and analysis are carried out according to standard analytical procedures, the data are considered comparable. Comparability is also dependent upon other PARCC criteria, because only when precision, accuracy, and representativeness are known can data sets be compared with confidence.

Completeness is defined as the percentage of acceptable sample results compared to the total number of sample results. Completeness is evaluated to determine if an acceptable amount of usable data were obtained so that a valid scientific site assessment can be completed. Completeness equals the total number of sample results for each fraction minus the total number of rejected sample results divided by the total number of sample results multiplied by 100. As specified in the project DQOs, the goal for completeness for target analytes in each analytical fraction is 90 percent.

Percent completeness is calculated using the following equation:

$$\%C = (T - R)/T \times 100$$

where:
%C = percent completeness
T   = total number of sample results
R   = total number of rejected sample results

Completeness is also determined by comparing the planned number of samples per method and matrix as specified in the QAPP, with the number determined above.

The following sections present a review of QC data for each analytical method.

2.0   VOLATILE ORGANIC COMPOUNDS (METHOD 8260B)

A total of six water samples were analyzed for VOCs by EPA SW 846 Method 8260B. All VOC data were assessed to be valid since none of the 450 total results were rejected based on holding time or QC exceedances. This section discusses the QA/QC supporting documentation as defined by the PARCC criteria and evaluated based on the DQOs.

2.1   Precision and Accuracy

2.1.1   Instrument Calibration

Initial and continuing calibration results provide a means of evaluating accuracy within a particular SDG. Relative response factor (RRF), percent relative standard deviation (%RSD), and percent difference (%D) are the three major parameters used to measure the effectiveness of instrument calibration. RRF is a measure of the relative spectral response of an analyte compared to its internal standard. %RSD is an indication of deviation of individual calibration standards compared to the average response of the initial multi-point instrument calibration. %D is a comparison of a continuing calibration instrumental response with its initial response. %RSD and %D exceedances suggest routine instrumental anomalies, which typically impact all sample results for the affected compounds.

The %RSDs met the acceptance criteria of 30 percent or the coefficients of determination (r^2) were greater than 0.990 in the initial calibration.

Five 2-butanone and carbon tetrachloride results were qualified as detected estimated (J+) or non-detected estimated (UJ). The RRF was outside the acceptance criteria of 0.05 for 2-butanone in the initial and continuing calibrations and the %D was outside the acceptance criteria of 25 percent for carbon tetrachloride in the continuing calibration. The details regarding the qualification of results are presented in Attachment A, Sections III and IV.

2.1.2   Surrogates

All surrogate %Rs were within the acceptance criteria.

2.1.3   MS Samples

No data were qualified due to high MS %Rs. The associated sample results were non-detected. The MS %R non-conformances are presented in Attachment A, Section VII.

2.1.4　LCS Samples

All LCS %Rs were within the acceptance criteria.

2.1.5　Internal Standards

All internal standards met the acceptance criteria for areas and retention times.

2.1.6　Field Duplicate Samples

The field duplicate samples were evaluated for acceptable precision with RPDs for the analytes. Sample data were not qualified on the basis of field duplicate precision. The field duplicate results are presented in Attachment A, Section XVI.

2.1.7　Compound Quantitation and Target Identification

All compound quantitation and target identification were found to be acceptable.

2.2　Representativeness

2.2.1　Holding Times

The evaluation of holding times to verify compliance with the method was conducted. All holding times were met.

2.2.2　Blanks

Method blanks, equipment blanks and field blanks were collected and analyzed to evaluate representativeness. The concentration for an individual target compound in any of the three types of QA/QC blanks were used for data qualification.

If contaminants were detected in a blank, corrective actions were made for the chemical analytical data during data validation. The corrective action consisted of amending the laboratory reported results based on the following criteria.

> Results Below the RL If a sample result for the blank contaminant was less than the RL and less than 10 times the blank value for common contaminants or 5 times the blank value for other contaminants, the sample result was amended as a non-detected at the RL for the target compound.

> Results Above the RL If a sample result for the blank contaminant was greater than the sample RL and less than 10 times the blank value for common contaminants or 5 times the blank value for other contaminants, the sample result for the blank contaminant was amended as an estimated non-detect at the concentration reported in the sample results.

> No Action If a sample result for the blank contaminant was greater than 10 times the blank value for common contaminants or 5 times the blank value for other contaminants, the result was not amended.

2.2.2.1 Method Blanks

No data were qualified due to the contaminant detected in the method blank.

2.2.2.2 Equipment Blanks

Due to equipment blank contamination, the chlorobenzene results for samples AA-MW-23 and AA-MW-23D were qualified as non-detected (U). The details regarding the qualification of results are presented in Attachment A, Section V.

2.2.2.3 Field Blanks

No data were qualified due to the contaminant detected in the field blank.

2.3   Comparability

The laboratory used standard analytical methods for all of the analyses. In all cases, the method detection limits attained were at or below the reporting limit. Target compounds detected below the reporting limits flagged (J) by the laboratory should be considered estimated. The comparability of the data is regarded as acceptable.

2.4   Completeness

The completeness level attained for VOC field samples was 100 percent. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100.

3.0   SEMIVOLATILE ORGANIC COMPOUNDS

A total of six water samples were analyzed for SVOCs by EPA SW 846 Method 8270C. All SVOC data were were assessed to be valid since none of the 510 total results were rejected based on holding time or QC exceedances. This section discusses the QA/QC supporting documentation as defined by the PARCC criteria and evaluated based on the DQOs.

3.1   Precision and Accuracy

3.1.1   Instrument Calibration

As previously discussed in Section 2.1.1, initial and continuing calibration results provide a means of evaluating accuracy.

The %RSDs met the acceptance criteria of 30 percent or the coefficients of determination (r^2) were greater than 0.990 in the initial calibration. The RRFs met the acceptance criteria of $\geq$ 0.05 in the initial calibration and continuing calibration. The %Ds in the initial calibration verification met the acceptance criteria of 25 percent.

Twelve benzoic acid and n-hydroxymethylphthalimide results were qualified as non-detected estimated (UJ). The %Ds in the continuing calibration were outside the acceptance criteria of 25 percent. The details regarding the qualification of results are presented in Attachment B, Section IV.

3.1.2 Surrogates

All surrogate %Rs were within the acceptance criteria.

3.1.3 MS/MSD Samples

MS/MSDs were not performed for this analysis due to insufficient sample volume. Since the LCS/LCSD %Rs and RPDs met the acceptance criteria, the absence of MS/MSD samples was judged to have no impact on the data quality and no qualifications were made.

3.1.4 LCS/LCSD Samples

All LCS/LCSD %R and RPDs were within the acceptance criteria.

3.1.5 Internal Standards

All internal standards met the acceptance criteria for areas and retention times.

3.1.6 Field Duplicate Samples

The field duplicate samples were evaluated for acceptable precision with RPDs for the analytes. Sample data were not qualified on the basis of field duplicate precision. The field duplicate results are presented in Attachment B, Section XVI.

3.1.7 Compound Quantitation and Target Identification

All compound quantitation and target identification were found to be acceptable.

3.2 Representativeness

3.2.1 Holding Times

The evaluation of holding times to verify compliance with the method was conducted. All holding times were met.

3.2.2 Blanks

As previously discussed in Section 2.2.2, method blanks were analyzed to evaluate representativeness.

3.2.2.1 Method Blanks

No contaminants were detected in the method blanks for this analysis.

3.3 Comparability

The laboratory used standard analytical methods for all of the analyses. In all cases, the method detection limits attained were at or below the reporting limit. Target compounds detected below the reporting limits flagged (J) by the laboratory should be considered estimated. The comparability of the data is regarded as acceptable.

3.4   Completeness

The completeness level attained for SVOC field samples was 100 percent. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100.

4.0   CHLORINATED PESTICIDES

A total of 6 water samples were analyzed for pesticides by EPA SW 846 Method 8081A. All pesticide data were assessed to be valid since none of the 138 total results were rejected based on holding time or QC exceedances. This section discusses the QA/QC supporting documentation as defined by the PARCC criteria and evaluated based on the DQOs.

4.1   Precision and Accuracy

4.1.1   Instrument Calibration

Initial and continuing calibration results provide a means of evaluating accuracy within a particular SDG. Percent relative standard deviation (%RSD) and percent difference (%D) are the two major parameters used to measure the effectiveness of instrument calibration. %RSD is an expression of the linearity of instrument response. %D is a comparison of a continuing calibration instrumental response with its initial response. %RSD and %D exceedances suggest more routine instrumental anomalies, which typically impact all sample results for the affected compounds.

The %RSDs in the initial calibration met the acceptance criteria of 20 percent. The %Ds in the continuing calibration and initial calibration verification met the acceptance criteria of 15 percent.

4.1.2   Surrogates

All surrogate %Rs were within the acceptance criteria.

4.1.3   MS/MSD Samples

MS/MSDs were not performed for this analysis. Since the LCS/LCSD %Rs and RPDs met the acceptance criteria, the absence of MS/MSD samples was judged to have no impact on the data quality and no qualifications were made.

4.1.4   LCS/LCSD Samples

All LCS/LCSD %R and RPDs were within the acceptance criteria.

4.1.5   Field Duplicate Samples

No chlorinated pesticides were detected in the field duplicates.

4.1.6   Compound Quantitation and Target Identification

All compound quantitation and target identification were found to be acceptable.

4.2   Representativeness

4.2.1   Holding Times

The evaluation of holding times to verify compliance with the method was conducted. All holding times were met.

4.2.2   Blanks

As previously discussed in Section 2.2.2, method blanks were analyzed to evaluate representativeness.

4.2.2.1 Method Blanks

No contaminants were detected in the method blanks for this analysis.

4.3   Comparability

The laboratory used standard analytical methods for all of the analyses. In all cases, the method detection limits attained were at or below the reporting limit. Target compounds detected below the reporting limits flagged (J) by the laboratory should be considered estimated. The comparability of the data is regarded as acceptable.

4.4   Completeness

The completeness level attained for chlorinated pesticide field samples was 100 percent. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100.

5.0   METALS

A total of six water samples were analyzed for metals by EPA SW 846 Method 6020/7470A and dissolved metals by EPA SW 846 Method 6010B. All metal data were assessed to be valid since none of the 72 total results were rejected based on holding time or QC exceedances. This section discusses the QA/QC supporting documentation as defined by the PARCC criteria and evaluated based on the DQOs.

5.1   Precision and Accuracy

5.1.1   Instrument Calibration

Initial and continuing calibration verification results provide a means of evaluating accuracy within a particular SDG. Correlation coefficient (r) and percent recovery (%R) are the two major parameters used to measure the effectiveness of instrument calibration. The correlation coefficient indicates the linearity of the calibration curve. %R is used to verify the on going calibration acceptability of the analytical system. The most critical of the two calibration parameters, r, has the potential to affect data accuracy across an SDG when it is outside the acceptable QC limits. %R exceedances suggest more routine instrumental anomalies, which typically impact all sample results for the affected analytes.

The %Rs in the continuing calibration verification met the acceptance criteria of 90-110 percent and the correlation coefficients in the initial calibrations met the acceptance criteria of ≥ 0.995

5.1.2 MS/MSD Samples

All MS/MSD %R and RPDs were within the acceptance criteria.

5.1.3 LCS Samples

All LCS %Rs were within the acceptance criteria.

5.1.5 Internal Standards

All internal standard %Rs were within acceptance criteria for sample AA-MW-22.

5.1.6 ICP Interference Check Sample

Due to ICP interference check %Rs outside acceptance criteria, six silver results were qualified as non-detected estimated (UJ). The details regarding the qualification of results are presented in Attachment D, Section IV.

5.1.7 Field Duplicate Samples

The field duplicate samples were evaluated for acceptable precision with RPDs for the analytes. Sample data were not qualified on the basis of field duplicate precision. The field duplicate results are presented in Attachment D, Section XIII.

5.1.8 Sample Result Verification

All compound quantitation and target identification were found to be acceptable.

5.2 Representativeness

5.2.1 Holding Times

The evaluation of holding times to verify compliance with the method was conducted. All holding times were met.

5.2.2 Blanks

As previously discussed in Section 2.2.2, method blanks were analyzed to evaluate representativeness.

5.2.2.1 Method Blanks

No data were qualified due to the contaminant detected in the method blank.

5.3 Comparability

The laboratory used standard analytical methods for all of the analyses. In all cases, the method detection limits attained were at or below the reporting limit. Target analytes detected below the reporting limits flagged (J) by the laboratory should be considered estimated. The comparability of the data is regarded as acceptable.

5.4 Completeness

The completeness level attained for metal field samples was 100 percent. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100.

6.0 WET CHEMISTRY

A total of six water samples were analyzed for conductivity by EPA Method 120.1, bromide, chloride, fluoride, nitrate, nitrite, orthphosphate and sulfate by EPA Method 300.0, perchlorate by EPA Method 314.0, ammonia as ammonium by EPA Method 350.3, alkalinity by Standard Method 2320B, TDS by Standard Method 2540C, and cation/anion balance by Calculation Method. All wet chemistry data were assessed to be valid since none of the 78 total results were rejected based on holding time or QC exceedances. This section discusses the QA/QC supporting documentation as defined by the PARCC criteria and evaluated based on the DQOs.

6.1 Precision and Accuracy

6.1.1 Instrument Calibration

As previously discussed in Section 5.1.1, initial and continuing calibration results provide a means of evaluating accuracy.

The correlation coefficients in the initial calibrations were within the acceptance criteria of ≥ 0.995.

Three ammonia as ammonium results were qualified as detected estimated (J+). The %R in the continuing calibration verification was outside the acceptance criteria of 90-110 percent. The details regarding the qualification of results are presented in Attachment E, Section IIb.

6.1.2 MS/MSD Samples

All MS/MSD %R and RPDs were within the acceptance criteria.

6.1.3 Duplicate (DUP) Samples

All DUP RPDs were within the acceptance criteria.

6.1.5 LCS Samples

All LCS %Rs were within acceptance criteria.

6.1.6 Field Duplicate Samples

The field duplicate samples were evaluated for acceptable precision with RPDs for the analytes. Sample data were not qualified on the basis of field duplicate precision. The field duplicate results are presented in Attachment E, Section IX.

6.1.7 Sample Result Verification

All compound quantitation and target identification were found to be acceptable.

6.2   Representativeness

6.2.1   Holding Times

The evaluation of holding times to verify compliance with the method was conducted. All holding times were met.

6.2.2   Blanks

As previously discussed in Section 2.2.2, method blanks were analyzed to evaluate representativeness.

6.2.2.1 Method Blanks

Due to method blank contamination, two fluoride results for samples AA-MW-20 and AA-MW-21 were qualified as non-detected (U). The details regarding the qualification of results are presented in Attachment E, Section III.

6.3   Comparability

The laboratory used standard analytical methods for all of the analyses. In all cases, the method detection limits attained were at or below the reporting limit. Target analytes detected below the reporting limits flagged (J) by the laboratory should be considered estimated. The comparability of the data is regarded as acceptable.

6.4   Completeness

The completeness level attained for wet chemistry field samples was 100 percent. This percentage was calculated as the total number of accepted sample results divided by the total number of sample results multiplied by 100.

7.0   VARIANCES IN ANALYTICAL PERFORMANCE

The laboratory used standard analytical methods for all of the analyses throughout the project. No systematic variances in analytical performance were noted according to the laboratory case narratives.

8.0   SUMMARY OF PARCC CRITERIA

The validation reports present the PARCC results for all SDGs. Each PARCC criterion is discussed in detail in the following sections.

8.1   Precision and Accuracy

Precision and accuracy were evaluated using data quality indicators such as calibration, surrogates, MS/MSD, and LCS. The precision and accuracy of the data set were considered acceptable after integration of qualification of estimated results as noted in Sections 2.1.1, 3.1.1, 5.1.6 and 6.1.1.

8.2   Representativeness

All samples for each method and matrix were evaluated for holding time compliance. All samples were associated with a method blank in each individual SDG. The representativeness of the project data is considered acceptable.

8.3   Comparability

The laboratory used standard analytical methods for their analyses. The analytical results were reported in correct standard units. Holding times, sample preservation, and sample integrity were within QC criteria. The overall comparability is considered acceptable.

8.4   Completeness

Of the 1248 total analytes reported, none of the sample results were rejected. The completeness for all SDGs is as follows:

Parameter (Method)	Total Analytes	No. of Rejects	% Completeness
VOC	450	0	100
SVOC	510	0	100
Chlorinated Pesticides	138	0	100
Metals	72	0	100
Wet Chemistry	78	0	100
Total	**1248**	**0**	**100**

The completeness percentage based on rejected data met the 90 percent DQO goal. A less quantifiable loss of data occurred in the application of blank qualifications as noted in Sections 2.2.2.2 and 6.2.2.1.

9.0   CONCLUSIONS AND RECOMMENDATIONS

The data quality assessment for the laboratory analytical results generated for the July 2008 groundwater monitoring conducted in accordance with the *Work Plan to Further Evaluate Lithologic and Hydrogeologic Conditions at the Closed Ponds Area (CPA),* in Henderson, Nevada established that the overall project requirements and completeness levels were met. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the level III and IV data validation all other results are considered valid and usable for all purposes.

10.0 REFERENCES

GeoSyntec Consultants, *Work Plan to Further Evaluate Lithologic and Hydrogeologic Conditions at the Closed Ponds Area (CPA),* May 30, 2008.

NDEP Data Verification and Validation Requirements established for the BMI Plant Sites and Common Areas Projects, Henderson, Nevada, May 3, 2006,

*Quality Assurance Project Plan Site-wide Soil and Groundwater Investigations Former Montrose and Stauffer Sites, Henderson, Nevada (*QAPP), Revision 1.0, October 26, 2006,

USEPA 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*, October 1999,

USEPA 2004. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, October 2004,

____,1996. EPA SW 846 *Third Edition, Test Methods for Evaluating Solid Waste, update I, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December*

Table I. Sample Cross-Reference

SDG#: IRG1461															LDC#: 19429A	
Project Name: Former Montrose CPA Groundwater					Parameters/Analytical Method											
Client ID #	Lab ID #	Matrix	QC Type	Date Collected	VOC (8260B)	SVOC (8270C)	Pest. (8081A)	Metals (6020/ 7470A)	Diss. Metals (6010B)							
AA-MW-23	IRG1461-01	water	FD	07/16/08	X	X	X	X	X							
AA-MW-23D	IRG1461-02	water	FD	07/16/08	X	X	X	X	X							
AA-MW-20	IRG1461-03	water		07/16/08	X	X	X	X	X							
AA-MW-22	IRG1461-04	water		07/16/08	X	X	X	X	X							
AA-MW-21	IRG1461-05	water		07/16/08	X	X	X	X	X							
AA-MW-24	IRG1461-06	water		07/16/08	X	X	X	X	X							
FB-0716*	IRG1461-07	water	FB	07/16/08	X											
EB-0716*	IRG1461-08	water	EB	07/16/08	X											
AA-MW-23MS	IRG1461-01MS	water	MS	07/16/08	X			X								
AA-MW-23MSD	IRG1461-01MSD	water	MSD	07/16/08				X								

*These QC samples were not validated; however results detected in these QC samples were compared to the environmental samples.

Shaded cells underwent Level IV review
EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate
Alk. = Alkalinity,, Cond. = Conductivity

Table I.   Sample Cross-Reference (cont.)

SDG#: IRG1461													LDC#: 19429A		
Project Name: Former Montrose CPA Groundwater					Parameters/Analytical Method										
Client ID #	**Lab ID #**	**Matrix**	**QC Type**	**Date Collected**	**Alk. (2320B)**	**NH₃ (350.3)**	**B, Cl, F, SO₄, PO₄ (300.0)**	**NO₂, NO₃ (300.0)**	**Cond. (120.1)**	**Cation/ Anion Balance**	**TDS (160.1)**	**ClO₄ (314.0)**			
AA-MW-23	IRG1461-01	water	FD	07/16/08	X	X	X	X	X	X	X	X			
AA-MW-23D	IRG1461-02	water	FD	07/16/08	X	X	X	X	X	X	X	X			
AA-MW-20	IRG1461-03	water		07/16/08	X	X	X	X	X	X	X	X			
AA-MW-22	IRG1461-04	water		07/16/08	X	X	X	X	X	X	X	X			
AA-MW-21	IRG1461-05	water		07/16/08	X	X	X	X	X	X	X	X			
AA-MW-24	IRG1461-06	water		07/16/08	X	X	X	X	X	X	X	X			
AA-MW-23MS	IRG1461-01MS	water	MS	07/16/08			X	X							
AA-MW-23MSD	IRG1461-01MSD	water	MSD	07/16/08			X	X							
AA-MW-23DUP	IRG1461-01DUP	water	DUP	07/16/08	X				X		X				

Shaded cells underwent Level IV review   2
EB = Equipment Blank, FB = Field Blank, FD = Field Duplicate, MS = Matrix Spike, MSD = Matrix Spike Duplicate
Alk. = Alkalinity,, Cond. = Conductivity

Table II.   Qualification Codes and Definitions

Code	Definition
1	Holding Times
2	Sample Preservation (i.e. Cooler Temp, Headspace)
3	Sample Custody
4	Missing Deliverables
5	Calibration
6	Field Blanks
7	Laboratory Blanks
8	Matrix Spike (%)
9	Matrix Spike Duplicate or Duplicate Sample (RPD)
10	Laboratory Control Sample
11	ICP Interference Check
12	RPD Between Two Columns
13	Surrogates
14	Field Duplicates
15	Furnace QC
16	ICP Serial Dilution
17	Chemical Recoveries
18	Trip Blanks
19	Internal Standards
20	Linear Range Exceeded
21	Potential False Positives
22	Do not use, other result more technically sound
23	Other

Table III.   Overall Qualified Results

SDG	Client Sample ID	Lab Sample ID	Sample Date/Time	Matrix	Method	Analyte	Lab Result	Reporting Limit	Lab Units	Validation Qualifier	Reason Code
IRG1461	AA-MW-23	IRG1461-01	07/16/2008 08:40:00	Water	EPA 8260B	Chlorobenzene	2.0	2.0	ug/l	U	6
IRG1461	AA-MW-23D	IRG1461-02	07/16/2008 08:55:00	Water	EPA 8260B	Chlorobenzene	2.0	2.0	ug/l	U	6
IRG1461	AA-MW-20	IRG1461-03RE1	07/16/2008 10:00:00	Water	EPA 8260B	2-Butanone (MEK)	ND	5000	ug/l	UJ	5
IRG1461	AA-MW-22	IRG1461-04RE1	07/16/2008 11:05:00	Water	EPA 8260B	2-Butanone (MEK)	ND	20	ug/l	UJ	5
IRG1461	AA-MW-21	IRG1461-05RE1	07/16/2008 12:05:00	Water	EPA 8260B	2-Butanone (MEK)	ND	4000	ug/l	UJ	5
IRG1461	AA-MW-21	IRG1461-05RE1	07/16/2008 12:05:00	Water	EPA 8260B	Carbon tetrachloride	330	2000	ug/l	J+	5
IRG1461	AA-MW-24	IRG1461-06	07/16/2008 13:40:00	Water	EPA 8260B	2-Butanone (MEK)	ND	10	ug/l	UJ	5
IRG1461	AA-MW-23	IRG1461-01	07/16/2008 08:40:00	Water	EPA 8270C	Benzoic acid	ND	19	ug/l	UJ	5
IRG1461	AA-MW-23	IRG1461-01	07/16/2008 08:40:00	Water	EPA 8270C	n-Hydroxymethylphthalimide	ND	190	ug/l	UJ	5
IRG1461	AA-MW-23D	IRG1461-02	07/16/2008 08:55:00	Water	EPA 8270C	Benzoic acid	ND	19	ug/l	UJ	5
IRG1461	AA-MW-23D	IRG1461-02	07/16/2008 08:55:00	Water	EPA 8270C	n-Hydroxymethylphthalimide	ND	190	ug/l	UJ	5
IRG1461	AA-MW-20	IRG1461-03	07/16/2008 10:00:00	Water	EPA 8270C	Benzoic acid	ND	48	ug/l	UJ	5
IRG1461	AA-MW-20	IRG1461-03	07/16/2008 10:00:00	Water	EPA 8270C	n-Hydroxymethylphthalimide	ND	480	ug/l	UJ	5
IRG1461	AA-MW-22	IRG1461-04	07/16/2008 11:05:00	Water	EPA 8270C	Benzoic acid	ND	19	ug/l	UJ	5
IRG1461	AA-MW-22	IRG1461-04	07/16/2008 11:05:00	Water	EPA 8270C	n-Hydroxymethylphthalimide	ND	190	ug/l	UJ	5
IRG1461	AA-MW-21	IRG1461-05	07/16/2008 12:05:00	Water	EPA 8270C	Benzoic acid	ND	95	ug/l	UJ	5
IRG1461	AA-MW-21	IRG1461-05	07/16/2008 12:05:00	Water	EPA 8270C	n-Hydroxymethylphthalimide	ND	950	ug/l	UJ	5
IRG1461	AA-MW-24	IRG1461-06	07/16/2008 13:40:00	Water	EPA 8270C	Benzoic acid	ND	20	ug/l	UJ	5
IRG1461	AA-MW-24	IRG1461-06	07/16/2008 13:40:00	Water	EPA 8270C	n-Hydroxymethylphthalimide	ND	200	ug/l	UJ	5
IRG1461	AA-MW-23	IRG1461-01	07/16/2008 08:40:00	Water	EPA 6020	Silver	ND	1.0	ug/l	UJ	11
IRG1461	AA-MW-23D	IRG1461-02	07/16/2008 08:55:00	Water	EPA 6020	Silver	ND	1.0	ug/l	UJ	11
IRG1461	AA-MW-20	IRG1461-03	07/16/2008 10:00:00	Water	EPA 6020	Silver	ND	1.0	ug/l	UJ	11
IRG1461	AA-MW-22	IRG1461-04	07/16/2008 11:05:00	Water	EPA 6020	Silver	ND	1.0	ug/l	UJ	11
IRG1461	AA-MW-21	IRG1461-05	07/16/2008 12:05:00	Water	EPA 6020	Silver	ND	1.0	ug/l	UJ	11
IRG1461	AA-MW-24	IRG1461-06	07/16/2008 13:40:00	Water	EPA 6020	Silver	ND	1.0	ug/l	UJ	11
IRG1461	AA-MW-20	IRG1461-03	07/16/2008 10:00:00	Water	EPA 300.0	Fluoride	0.50	0.50	mg/l	U	7
IRG1461	AA-MW-21	IRG1461-05	07/16/2008 12:05:00	Water	EPA 300.0	Fluoride	0.50	0.50	mg/l	U	7
IRG1461	AA-MW-20	IRG1461-03	07/16/2008 10:00:00	Water	EPA 350.3	Ammonia as Ammonium	0.13	0.60	mg/l	J+	5
IRG1461	AA-MW-21	IRG1461-05	07/16/2008 12:05:00	Water	EPA 350.3	Ammonia as Ammonium	0.26	0.60	mg/l	J+	5
IRG1461	AA-MW-24	IRG1461-06	07/16/2008 13:40:00	Water	EPA 350.3	Ammonia as Ammonium	0.14	0.60	mg/l	J+	5

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ATTACHMENT A

VOCs Data Validation Report

Volatile Organic Compounds by EPA SW 846 Method 8260B

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds and system performance check compounds (SPCCs) were within method and validation criteria with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/19/08	2-Butanone	0.048 ($\exists$0.05)	AA-MW-20 AA-MW-24 AA-MW-22 AA-MW-21	UJ (all non-detects)	A

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Attachment A

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
7/22/08 (VSTD025A)	Acetone 2-Butanone 2-Hexanone	43.7 36.2 27.4	AA-MW-23 AA-MW-23D	NA NA NA	-
7/22/08 (HEND025)	2,2-Dimethylpentane 2,4-Dimethylpentane 3,3-Dimethylpentane 2-Methylhexane 3-Ethylpentane n-Heptane	29.2 30.0 26.8 31.0 33.6 28.0	AA-MW-23 AA-MW-23D	NA NA NA NA NA NA	-
7/23/08 (VSTD025A)	2,2-Dichloropropane 1,2-Dichloroethane	30.5 25.9	AA-MW-20 AA-MW-22 AA-MW-21 AA-MW-24	NA NA	-
7/23/08 (VSTD025A)	Carbon tetrachloride	33.9	AA-MW-21	J+ (all detects)	A
7/23/08 (VSTD025A)	Carbon tetrachloride	33.9	AA-MW-20 AA-MW-22 AA-MW-24	NA	-

Although the above listed %Ds flagged "NA" demonstrate a high bias, the affected compounds in the associated samples were non-detected and did not warrant the qualification of the data.

All of the continuing calibration RRF values were within method and validation criteria with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
7/23/08 (VSTD025A)	2-Butanone	0.046 ($\exists$0.05)	AA-MW-20 AA-MW-22 AA-MW-21 AA-MW-24	UJ (all non-detects)	A

Attachment A

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
8G22026-BLK1	7/22/08	Methylene chloride	1.00 ug/L	AA-MW-23 AA-MW-23D

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks.

Sample EB-0716 was identified as an equipment blank. No volatile contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB-0716	7/16/08	Benzene Chlorobenzene	1.2 ug/L 0.85 ug/L	All samples in SDG IRG1461

Sample FB-0716 was identified as a field blank. No volatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB-0716	7/16/08	Methylene chloride	1.1 ug/L	All samples in SDG IRG1461

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
AA-MW-23	Chlorobenzene	0.82 ug/L	2.0U ug/L
AA-MW-23D	Chlorobenzene	0.65 ug/L	2.0U ug/L

Attachment A

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	%R (Limits)	Flag	A or P
AA-MW-23MS (AA-MW-23)	sec-Butylbenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene cis-1,3-Dichloropropene o-Xylene	131 (65-125) 129 (70-125) 127 (70-125) 147 (70-130) 127 (65-125)	NA NA NA NA NA	-

Although the above listed %Rs flagged "NA" demonstrate a high bias, the affected compounds in the associated sample were non-detected and did not warrant the qualification of the data.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

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XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples AA-MW-23 and AA-MW-23D were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	AA-MW-23	AA-MW-23D	
Carbon tetrachloride	0.84	1.0	17
Chlorobenzene	0.82	0.65	23
Chloroform	24	28	15
1,1-Dichloroethene	0.77	0.97	23
Trichloroethene	1.8	2.2	20

Attachment A

Former Montrose CPA Groundwater
Volatile Organic Compounds - Data Qualification Summary - SDG IRG1461

SDG	Sample	Compound	Flag	A or P	Reason (Code)
IRG1461	AA-MW-20 AA-MW-24 AA-MW-22 AA-MW-21	2-Butanone	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (5)
IRG1461	AA-MW-21	Carbon tetrachloride	J+ (all detects)	A	Continuing calibration (%D) (5)
IRG1461	AA-MW-20 AA-MW-22 AA-MW-21 AA-MW-24	2-Butanone	UJ (all non-detects)	A	Continuing calibration (RRF) (5)

Former Montrose CPA Groundwater
Volatile Organic Compounds - Laboratory Blank Data Qualification Summary - SDG IRG1461

No Sample Data Qualified in this SDG

Former Montrose CPA Groundwater
Volatile Organic Compounds - Field Blank Data Qualification Summary - SDG IRG1461

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
IRG1461	AA-MW-23	Chlorobenzene	2.0U ug/L	A	6
IRG1461	AA-MW-23D	Chlorobenzene	2.0U ug/L	A	6

ATTACHMENT B

SVOCs Data Validation Report

Semivolatile Organic Compounds by EPA Method 8270C

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

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Date	Compound	%D	Associated Samples	Flag	A or P
7/22/08 (SSTD050)	Benzoic acid	37	All samples in SDG IRG1461	UJ (all non-detects)	A
7/22/08 (HSTD050)	n-(Hydroxymethyl)phthalimide	46	All samples in SDG IRG1461	UJ (all non-detects)	A

The percent differences (%D) of the second source calibration standard were less than or equal to 25.0% for all compounds.

All of the continuing calibration RRF values were greater than or equal to 0.05.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

No field blanks were identified in this SDG.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there was insufficient sample volume for analysis of the matrix spike and matrix spike duplicate.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

Samples AA-MW-23 and AA-MW-23D were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	AA-MW-23	AA-MW-23D	
Bis(2-ethylhexyl)phthalate	48U	10	200

Attachment B

Former Montrose CPA Groundwater
Semivolatile Organic Compounds - Data Qualification Summary - SDG IRG1461

SDG	Sample	Compound	Flag	A or P	Reason
IRG1461	AA-MW-23 AA-MW-23D AA-MW-20 AA-MW-22 AA-MW-21 AA-MW-24	Benzoic acid n-(Hydroxymethyl)phthalimide	UJ (all non-detects) UJ (all non-detects)	A	Continuing calibration (%D)

Former Montrose CPA Groundwater
Semivolatile Organic Compounds - Laboratory Blank Data Qualification Summary - SDG IRG1461

No Sample Data Qualified in this SDG

Former Montrose CPA Groundwater
Semivolatile Organic Compounds - Field Blank Data Qualification Summary - SDG IRG1461

No Sample Data Qualified in this SDG

ATTACHMENT C

Chlorinated Pesticides Data Validation Report

Chlorinated Pesticides by EPA SW 846 Method 8081A

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were evaluated and considered technically acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits.

The percent differences (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide contaminants were found in the method blanks.

No field blanks were identified in this SDG.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples AA-MW-23 and AA-MW-23D were identified as field duplicates. No chlorinated pesticides were detected in any of the samples.

Former Montrose CPA Groundwater
Chlorinated Pesticides - Data Qualification Summary - SDG IRG1461

No Sample Data Qualified in this SDG

Former Montrose CPA Groundwater
Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG IRG1461

No Sample Data Qualified in this SDG

Former Montrose CPA Groundwater
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG IRG1461

No Sample Data Qualified in this SDG

ATTACHMENT D

Metals Data Validation Report

Metals by EPA SW 846 Method 6020/7470A
Dissolved Metals by EPA SW 846 Method 6010B

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Sodium, Dissolved	0.278 mg/L	AA-MW-23 AA-MW-23D AA-MW-20 AA-MW-22 AA-MW-21 AA-MW-24

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

No field blanks were identified in this SDG.

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met with the following exceptions:

Date	ICS ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
7/18/08	ICSAB (14:04)	Silver	72 (80-120)	AA-MW-23 AA-MW-23D AA-MW-20 AA-MW-22 AA-MW-21 AA-MW-24	UJ (all non-detects)	P

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

Attachment D

XIII. Field Duplicates

Samples AA-MW-23 and AA-MW-23D were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	AA-MW-23	AA-MW-23D	
Arsenic	49	53	8
Barium	36	36	0
Cadmium	0.29	0.23	23
Chromium	16	14	13
Selenium	2.7	2.6	4
Calcium, Dissolved	120	130	8
Magnesium, Dissolved	47	53	12
Potassium, Dissolved	11	12	9
Sodium, Dissolved	230	250	8

Attachment D

Former Montrose CPA Groundwater
Metals - Data Qualification Summary - SDG IRG1461

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
IRG1461	AA-MW-23 AA-MW-23D AA-MW-20 AA-MW-22 AA-MW-21 AA-MW-24	Silver	UJ (all non-detects)	P	ICP interference check (%R) (11)

Former Montrose CPA Groundwater
Metals - Laboratory Blank Data Qualification Summary - SDG IRG1461

No Sample Data Qualified in this SDG

Former Montrose CPA Groundwater
Metals - Field Blank Data Qualification Summary - SDG IRG1461

No Sample Data Qualified in this SDG

ATTACHMENT E

Wet Chemistry Data Validation Report

Conductivity by EPA Method 120.1
Bromide, Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, and Sulfate by EPA Method 300.0
Perchlorate by EPA Method 314.0
Ammonia as Ammonium by EPA Method 350.3
Alkalinity by Standard Method 2320B
Total Dissolved Solids by Standard Method 2540C
Cation/Anion Balance by Calculation Method

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
7/17/08	CCV	Ammonia as ammonium	112.8 (90-110)	AA-MW-20 AA-MW-21 AA-MW-24	J+ (all detects)	P
7/17/08	CCV	Ammonia as ammonium	112.8 (90-110)	AA-MW-23 AA-MW-23D AA-MW-22	NA	-

Although the above listed %R flagged "NA" demonstrate a high bias, the affected analyte in the associated samples was non-detected and did not warrant the qualification of the data.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Fluoride Orthophosphate	0.1540 mg/L 0.4295 mg/L	All samples in SDG IRG1461

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
AA-MW-20	Fluoride	0.36 mg/L	0.50U mg/L
AA-MW-21	Fluoride	0.29 mg/L	0.50U mg/L

No field blanks were identified in this SDG.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VII. Sample Result Verification

All sample result verifications were acceptable.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

Samples AA-MW-23 and AA-MW-23D were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/L)		RPD
	AA-MW-23	AA-MW-23D	
Alkalinity	68	64	6
Bromide	0.67	0.70	4
Chloride	170	170	0
Fluoride	0.79	0.80	1
Nitrate	11	12	9
Sulfate	770	800	4
Total dissolved solids	1500	1600	6

Analyte	Concentration		RPD
	AA-MW-23	AA-MW-23D	
Perchlorate	92 ug/L	140 ug/L	41
Conductivity	2000 umhos/cm	2000 umhos/cm	0
Cation/Anion Balance	-5.0%	-3.0%	86

Attachment E

Former Montrose CPA Groundwater
Wet Chemistry - Data Qualification Summary - SDG IRG1461

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
IRG1461	AA-MW-20 AA-MW-21 AA-MW-24	Ammonia as ammonium	J+ (all detects)	P	Calibration (%R) (5)

Former Montrose CPA Groundwater
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG IRG1461

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
IRG1461	AA-MW-20	Fluoride	0.50U mg/L	A	7
IRG1461	AA-MW-21	Fluoride	0.50U mg/L	A	7

Former Montrose CPA Groundwater
Wet Chemistry - Field Blank Data Qualification Summary - SDG IRG1461

No Sample Data Qualified in this SDG